Transportation Synthesis Report

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Improving the Accuracy of Real Estate Cost Estimates And Reducing Final Costs

Prepared for
Office of Policy, Budget and Finance

Prepared by
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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WisDOT technical staff in highway development, construction and operations. Online and print sources include NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs, and related academic and industry research. Internet hyperlinks in TSRs are active at the time of publication, but changes on the host server can make them obsolete.

Request for Report

WisDOT's Office of Policy, Budget and Finance is currently reviewing the department's real estate acquisition process to identify opportunities for bringing initial estimates closer to final costs, and for reducing final costs. The Office asked us to identify applicable research on these topics and successful practices by other state DOTs.

Summary

We located three **Current Research Studies** that address the issue of cost estimation for real estate acquisition:

- FHWA and NCHRP are co-sponsoring a study that will look at current best practices specifically focusing on the right-of-way aspects of cost estimating.
- NCHRP is developing a guidebook that will provide appropriate strategies, methods and tools to develop, track and document realistic cost estimates during each phase of the project planning, programming and preconstruction process, and will include discussion and tools related to right-of-way acquisition.
- In her new paper, Kathy Facer, FHWA Realty Specialist, discusses a number of key principles for optimizing cost estimation for major projects, including right-of-way acquisition, and introduces a cross section of innovative right-of-way cost estimating procedures utilized by state DOTs.

In **State DOT Practices** we present a mixture of methodologies – three are from Kathy Fancer's paper, and we located five additional procedures through a telephone search:

- California: estimating agents are asked to input data on all reasonable alternatives using a "worst case" forecast (highest cost). Current value is estimated, new highest and best use in the projected acquisition year is evaluated and a future year cost escalator is applied.
- Florida: FDOT includes right-of-way as a percentage of overall construction costs by type of improvement.
- Iowa: when the right-of-way plan layout is received, appraisers provide a parcel-by-parcel estimate including relocation and damages. Historical predictors are factored using the appraiser estimate.
- Maryland: envisions the day when its Office of Real Estate Management System will have the ability to analyze and provide recommendations for land acquisition payments.
- South Carolina: has begun developing an appraisal database it will eventually use to help narrow down cost estimates for acquisition to actual expenses or current values of property.
- Texas: is attempting to get more realistic appraisals from independent fee appraisals following a recent history of "ultra-conservative" appraisals that may complicate the negotiating process.
- Virginia: rising condemnation awards in the state have increased the challenge of generating accurate estimates. VDOT has considered establishing separate funding for condemnation awards.
- Washington: after real estate estimates have been performed, several years may pass before a project is actually launched. One solution is to re-work the estimates closer to the time of the project, and adjust the project budget.

Current Research Studies

FHWA's Office of Real Estate Services has partnered with NCHRP to co-sponsor a study called *Right-of-way Methods and Tools to Control Project Cost Escalation* (NCHRP 8-36(64)). Scheduled to launch in July 2006, this is considered a first phase study that will look at current best practices specifically focusing on the right-of-way aspects of cost estimating. It will extend the work on right-of-way performed for NCRHP research project 8-49, described below. For more information contact Ron McCready, TRB Senior Program Officer, 202-334-3034, rmccready@nas.edu.

Procedures for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction

NCHRP Project 8-49: estimated completion date late summer or fall 2006
http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+8-49.
The objective of this research is to develop a guidebook on highway cost estimation management and project cost estimation procedures aimed at achieving greater consistency and accuracy between long-range transportation planning, priority programming and preconstruction cost estimates. The guidebook will provide appropriate strategies, methods and tools to develop, track and document realistic cost estimates during each phase of the process. The book will include discussion and tools related to right-of-way acquisition.

Right-of-Way Cost Estimate Status, Background, and DOT Samples

May 2006
Kathy Facer, ROW/Utilities/RR, Realty Specialist, FHWA
Contact Kathy at: 785-271-2448 ext. 224, kathleen.facer@fhwa.dot.gov.
(See Appendix A, p. 6-9 for the entire paper.)
This paper highlights some of the key principles for optimizing cost estimation for major projects, and right-of-way acquisition is among the principles discussed. The author also introduces a cross section of innovative right-of-way cost estimating procedures utilized by state DOTs.
Page 2: Right-of-Way
This is the cost to research and acquire right-of-way for the project, including easements. Include right-of-way costs for storm water management, wetland mitigation and other work outside the roadway prism. This includes the contractual obligations with property owners to relocate fencing, reconstruct gates, reconstruct road approaches etc., if not included in the engineer's estimate. This includes the cost of any required relocation of residents and businesses, as well as the administration costs of right-of-way activities. These administrative costs are typically understated: labor costs for environmental assessments, title research, appraisals or updated appraisals, lengthy negotiations and closings, as well as the hiring and managing right-of-way consultants.

If the extent of the right-of-way acquisition is not known, then a contingency should be added based upon historical settlements and awards for condemnation cases, which must include costs for attorneys, engineering research, witness research, survey and staff time. The right-of-way acquisition schedule needs to be considered. Right-of-way acquisition costs will increase quickly in rapidly developing areas. Early acquisition of right-of-way based on environmental documents may save money and protect the right-of-way from development. Costs must include relocation assistance and benefits for displaced individuals, families, businesses, governments and nonprofit organizations. Special acquisitions, such as those from government sites can be time consuming and costly. The user of right-of-way estimates always must recognize that the estimates are dependent upon the accuracy and reliability of information concerning the location of the right-of-way limits on a project. A small change in the location of the right-of-way line, or a change in access control or drainage retention placement, particularly in commercial areas, can affect the right-of-way cost estimate by millions of dollars because of required damage payments such as severance or business damages.

State DOT Practices

California DOT

Contact: Dan Murdock, Right-of Way Project Coordinator, 213-897-1816, dmurdock@dot.ca.gov.
Caltrans has a well thought out, detailed right-of-way cost estimating methodology in place since 1999 and documented in its Right-of-Way manual. Project estimate data sheets feed into a mainframe computer program that aggregates all project development estimates. Estimating agents are asked to input data on all reasonable alternatives using a "worst case" forecast (highest cost). Current value is estimated, new highest and best use in the projected acquisition year is evaluated and a future year cost escalator is applied. If design is not far enough along, a full take is assumed. Right-of-way estimate sheets containing all facets of acquisition, relocation, assumptions and limiting conditions are contained in Chapter 4 of the Caltrans Right-of-Way manual: see "Preparing the Estimate," Chapter 4.02, http://www.dot.ca.gov/hq/row/rowman/manual/ch4.pdf.
(From *Right-of-Way Cost Estimate Status, Background, and DOT Samples*, Kathy Facer, May 2006.)

Florida DOT
Contact: Tom Shields, Manager- Appraisal and Appraisal Review, 850-414-4545, thomas.shields@dot.state.fl.us.
FDOT includes right-of-way as a percentage of overall construction costs by type of improvement: see www.dot.state.fl.us/planning/policy/pdfs/transcost.pdf. Florida has a Web-based program, called Long Range Estimating, designed to be user friendly.
(From *Right-of-Way Cost Estimate Status, Background, and DOT Samples*, Kathy Facer, May 2006.)

Iowa DOT
Contact: Jim Olson, Design Supervisor- Office of Right of Way, 515-239-1551, james.olson@dot.state.ia.us.
IADOT's methodology starts at receipt of the project concept statement using historical right-of-way costs per mile that have been recorded for each type of project: four-lane, urban, rural, and so on. When the first rough plans are received a new estimate is completed, utilizing land values derived from sales in the project area. This is a "windshield" estimate on a parcel basis. When the right-of-way plan layout is received, appraisers provide a parcel-by-parcel estimate including relocation and damages. Historical predictors are factored using the appraiser estimate. In 2006 an additional 25 percent is added to compensate for signed contracts, administrative settlements and condemnation. Project estimates are updated at the beginning of each fiscal year. Project cost information is kept parcel by parcel using a spreadsheet format, this allows carrying over cost not acquired to the next year. At this time 7 percent is added for each additional year the project is extended. The 7 percent reflects the increase in land price. See Appendix B, p. 10: *Iowa Cost Estimate Procedure*, and separate Excel spreadsheet: *Iowa Sample ROW Cost Estimate*.
(From *Right-of-Way Cost Estimate Status, Background, and DOT Samples*, Kathy Facer, May 2006.)

Maryland DOT
Contact: Tom Hinchliffe, Office of Real Estate- Division Chief for Program Coordination, 410-545-0026, thinchliffe@sha.state.md.us.
"We have what we call our Office of Real Estate Management System," Tom said, "a database system which we believe will one day have the ability to analyze and suggest real estate acquisition costs. The system is currently about two years old and it's all-encompassing: we utilize it for everything from our record-keeping functions, to our land acquisition function, to our land disposal function. In terms of land acquisition, what we can do at this point is download electronic files of all of the parcels that we'll need for a particular project and input values for those parcels – appraisals, current sales values, potential settlements, etc. – that help us to determine what it will cost us to acquire the parcels. Part of what we envision for the system is giving it the ability to integrate and analyze this data along with historical data and possibly variable and contingency factors such as damages, and provide recommendations for land acquisition payments. We had wanted the system to include this ability from the start, but the consultant who developed it for us came up short. So there are a lot of things we need to fix and/or improve upon before we can really start to think about data integration. We currently have a workload issue on our IT side which we're trying to resolve, and we hope to some day start moving forward on giving the system these types of abilities."

South Carolina DOT
Contact: Rick Callaham, Chief Appraiser, 803-737-1406, callahamrd@scdot.org.
The following information was provided by Ken Feaster, Right-of-Way Administrator, Right-of-Way Section:
"We have begun developing an appraisal database. We can input information from appraisals that we have from different projects, and we can go in and query that, to see what the current-day values may be of properties on particular projects in specific areas. We can look at factors such as commercial sales vs. residential sales, for example. We can then apply that to some of the upcoming cost of projects. Of course, you have to adjust the values for inflation and other variables. Right now we're just setting up this system, downloading the information from appraisals to build the database. It's something we will be using in the future to help us narrow down our cost estimates for acquisition to actual expenses or current values of property."

Texas DOT
Contact: John Zimmerman, Attorney at Law, Director- Right-of-Way Division Acquisition Section, 512-416-2928, jzimmerm@dot.state.tx.us.
"I think our success (in estimating purchase costs) is probably quite variable across the state depending on who is doing the estimates and how familiar they are with the property," John said. "If they do the estimate early on, and quite a bit of time passes, depending on what the real estate market is, they still may be off. These estimates are usually done before they've even created right-of-way parcels. Before they've done a lot of surveying, they may have a general idea of how much land they need. Our problem is, once we even get down to specifics and we are formally appraising property -- and we use independent fee appraisers in Texas -- we still sometimes have what appears to be quite an increase from what a professional appraiser comes up with and what we eventually end up

paying. That's something that we are attempting remedy – get our appraisers to be more up front with us. In the old days – I'm talking about probably five or 10 years ago or more – I think a lot of appraisers tried to be ultra-conservative with their appraisals, thinking they could get more work if they, quote, 'save the state some money.' We're not looking for that type of an appraisal. We want what the property is worth today – at least a middle-of-the-road appraisal. When those things go up, either the market's doing it, or we're starting out with unduly low appraisals to begin with, which to me makes it harder to negotiate a purchase. You're more likely to go to eminent domain if you're too low at the beginning."

John cited the following documentation as a useful resource:
From: Texas DOT Appraisal and Review Manual
http://manuals.dot.state.tx.us/dynaweb/colrowma/apr/@Generic__BookView;cs=default;ts=default
Chapter 1 -- Introduction; Section 3 -- Preparing Right of Way Acquisition Estimates for New Projects- Preparing Project Data Information.
Every new project has physical and economic challenges unique to it, which must be understood before an acceptable estimate is accomplished. Without this preparation, the appraisal reviewer is usually limited in his/her value recommendation to a value indicated by one of two appraisals. The appraisal information relative to any project is too diversified for proper retention, particularly if the project is of any consequence. Therefore, the accumulation of the following information in advance will be helpful in subsequent project development:

- a general description of the type facility contemplated, whether full or partial access control, facility length, including whether the project is a new location or widening of an existing right of way;
- a brief outline of the area to be traversed;
- classification of properties involved;
- areas of similarity - physical and economic;
- areas with and without utilities;
- areas in transition from one classification to another;
- areas of special characteristics; and
- highest and best use.

Since staff appraisers prepare most right of way estimates, a considerable portion of the above information should be in the file. Completion of the comparable sales map and correlation with appropriate city and county maps augments this information. Sales data for all classifications of properties in all similar areas is accumulated and keyed to the right-of-way map. Proper accumulation and presentation of this data in an easily understandable fashion is not simple; yet, once accomplished, it meets three fundamental requirements:

- intelligent assignment of parcels to fee appraisers;
- determination of proper appraisal fees; and
- a more accurate estimate of right-of-way costs for funding.

With this information at the reviewer's disposal, he/she is now in position to make appraisal assignments and review the appraisal reports.

Virginia DOT
Contact: Spencer Dejarnette, Assistant District Right-of-Way Manager, 540-829-7588, Spencer.Dejarnette@VDOT.Virginia.gov.
"One of the big factors is condemnation," Spencer said. "The problem with estimating right-of-acquisition cost is typically not with the fair market value or the value of the building. The actual cost of the land itself is not the problem -- we can estimate that with reasonable accuracy. The problem is the uncertainty of condemnation awards. If you take condemnation increments out of the equation, and having to try to guess what the condemnation is going to be on a project, I can get you within 10 percent on just about any project out there. Some projects may be in counties that have a litigation mindset, and you can almost forget trying to guess what it's going to cost you. We used to use a condemnation increment of 30 percent of our right-of-way cost – typically that would keep us covered on the average project. But if you go into certain counties that have a history of coming back with big court awards for condemnations… There is also new state legislation that will go into effect July 1 (2006), that says that if the condemnation award goes over 30 percent of VDOT's last highest offer, VDOT will have to pay for the landowner's expert witnesses. That will add about $20,000 per case to our costs. So we are losing ground legislatively. I think we need to get more proactive. I understand that some DOTs across the country actually have a separate funding for their condemnation awards – they pay that out of a different pot. VDOT has talked about doing that."

Washington DOT
Contact: Gerry Gallinger, Director of Real Estate Services, 360-705-7305, gallinger@wsdot.wa.gov.
"Our biggest challenge," Gerry said, "is that, once a real estate estimate has been performed, the project typically sits for a number of years before it comes to reality. We have struggled with trying to find a way to adjust the estimate figure, and have ultimately determined that the way to adjust it is to do it over with the people from my

office. We simply redo the estimate closer to the time of the project, and then we adjust the project budget accordingly. We have found a moderate amount of success with that. It's obviously not 100 percent, but it's better. We have even on a few projects that are extremely large that we know are going to hang around for a number of years, done it more than once, to keep up with what the budget might be, so that we know when it comes time to program the project, whether or not we can."

Appendix A

Right-of-Way Cost Estimate Status, Background, and DOT Samples

Kathy Facer
May 4, 2006

Introduction

Sound cost estimating is important from early planning, through the NEPA process, and into the design and construction stages. There is growing demand from the public to be fiscally accountable. This is even more important with SAFETEA-LU calling for greater attention to major projects over $500 million. The good news is that there are cost estimating models available in many DOTs.

Cost estimates are critical as they set expectations, especially at the early stage. Estimates assist decision makers at specific points in time. In a fiscally constrained environment, it is important that decision makers have the best information. One of the challenges we face is the misuse of the estimate by those who are not familiar with either its originally intended purpose or its limitations. There are two ways to approach these issues. The first is to develop a number and surround it with caveats. The second, preferable, approach is to work to turn the caveats into actual numbers and produce a range. The Washington State DOT approach uses a range and appears to be a disciplined way to look at project uncertainties and then translate these uncertainties into an estimate that is usable for decision makers. We need to keep in mind the kind of decision being made and then apply the right estimating tool. This will require education for both the generators of the estimates and the users of the estimates.

Major Project Guidance

The Office of Real Estate services contributed to the Office of Infrastructure guidance issued in 2004, found at http://www.fhwa.dot.gov/programadmin/mega/cefinal.htm.

Contents of a Cost Estimate

The cost of a project is interpreted by the public to be "dollars spent on the project," or the equivalent of the total project purchase price. As such, the cost estimate should include all costs and the value of any resources needed to complete the design, right-of-way activities, environmental mitigation, construction, project management, etc., as well as costs and resources paid to others for work related to the project such as utility adjustments, environmental mitigations, and railroad relocations.

Year-of-Expenditure Dollars

The cost estimate for the project should be expressed in year-of-expenditure dollars if there are multiple construction contracts. This can be done by assigning an inflation rate per year to the proposed midpoint of construction, with some allowance for schedule slippage taken into account. For the right-of-way acquisition cost estimate, the year-of-expenditure will occur prior to the mid-point of construction. However, due to possible changes in scope, changes in the priority given to a project, project planning and development durations, the estimator must make certain that the selected year-of-expenditure reflects a realistic scenario. Potential schedule slippages can be accounted for in a project contingency. The project manager should clearly specify how inflation is to be considered in the estimate. The project manager may consider multiple sources for determining the inflation rate, including nationwide and local references. Include consideration of any locality-specific cost factors that may reflect a growth rate significantly in excess of the inflation rate, such as land acquisition costs in highly active markets. Reporting the costs in year-of-expenditure dollars will greatly reduce the media and public perception of cost growth.

Team of Experts

A skilled, interdisciplinary team should produce estimates. Estimates should be developed using a clearly identified scope of work. Estimates should be based on consultation and input from agency experts and not be developed in a vacuum. For example, right-of-way acquisition costs should be determined in consultation with an agency's right-of-way office. Field reviews should be taken prior to preparing any estimate. For work that is unusual, (e.g., buildings, railroads, mass transit, ferry boat docks, etc.) consultation with outside agencies may be appropriate.

Right-of-Way

This is the cost to research and acquire right-of-way for the project, including easements. Include right-of-way costs for storm water management, wetland mitigation, and other work outside the roadway prism. This includes the contractual obligations with property owners to relocate fencing, reconstruct gates, reconstruct road approaches, etc., if not included in the engineer's estimate. This includes the cost of any required relocation of residents and businesses, as well as the administration costs of right-of-way activities. These administrative costs are typically understated: labor costs for environmental assessments, title research, appraisals or updated appraisals, lengthy negotiations and closings, as well as the hiring and managing right-of-way consultants.

If the extent of the right-of-way acquisition is not known, then a contingency should be added based upon historical settlements and awards for condemnation cases, which must include costs for attorneys, engineering research, witness research, survey, and staff time. The right-of-way acquisition schedule needs to be considered. Right-of-way acquisition costs will increase quickly in rapidly developing areas. Early acquisition of right-of-way based on environmental documents may save money and protect the right-of-way from development. Costs must include relocation assistance and benefits for displaced individuals, families, businesses, governments, and nonprofit organizations. Special acquisitions, such as those from government sites can be time consuming and costly. The user of right-of-way estimates always must recognize that the estimates are dependent upon the accuracy and reliability of information concerning the location of the right-of-way limits on a project. A small change in the location of the right-of-way line, or a change in access control or drainage retention placement, particularly in commercial areas, can affect the right-of-way cost estimate by millions of dollars because of required damage payments such as severance or business damages.

External Third Party Adjustments for Utilities and Railroads

Perhaps the most difficult costs to estimate are those that are associated with third parties, such as utilities and railroads. Third party requirements have a high potential for risk and change. For example, major projects often are located in urban areas with a high concentration of existing utilities. While it is best to locate and avoid as many utilities as possible during the design phase, appropriate contingencies for utility adjustments need to be included. Cost should be included for subsurface utility engineering. Mitigating impacts to railroads or transit lines will need to be considered as well. If all utility and railroad adjustment work cannot be identified, appropriate contingencies for adjustments need to be included.

Validation of Estimates

Estimates on very large projects are very complex and subject to perceptions of being inappropriately manipulated. A second independent set of eyes to review the estimate will afford managers and decision makers an opportunity to capture a different perspective or at least a second opinion.

Revalidation of Estimates

Periodic reviews of estimates are important for several reasons. First, conditions, underlying assumptions, and scopes for original and subsequent estimates often change, thus estimates need to be refreshed to account for these changes. Second, throughout project development phases there are key decisions in the public interest that must be made based upon the most current and accurate estimates possible. Finally, management must have a means of minimizing the potential for unanticipated surprises concerning the financial condition of the project.

Estimating Risks

When preparing initial cost estimates during the NEPA process, all potential risks should be identified, analyzed, and quantified in the estimate. However, if this is not possible, because sufficient information is unavailable, a "worst-case" analysis may be appropriate to estimate costs. Existing facilities thought to be adequate may become inadequate because of changes to standards, new data, further deterioration prior to construction, etc. A worst-case scenario should only be used after analyzing the project and the available information carefully. Again, if there is considerable unknown information regarding the project, it may be suitable to attach a range to the cost estimate at this stage.

Continual Documentation

Cost estimates from the beginning to the end of a project must be reviewed continually to keep them current to reflect the project continuum. An integrated approach must be implemented to ensure that there is a seamless progression of the cost estimate from systems (long-range) planning through priority programming and NEPA to the final engineer's estimate. This means that all costs should be included in all stages of an estimate, including the planning, programming, and NEPA stages. Since not all information is known in the early stages of a project, an adequate contingency is appropriate instead of actual costs for some items.

The Interim Guidance on Major Projects was issued January 27, 2006. It can be read at http://www.fhwa.dot.gov/programadmin/mega/012706.cfm.

The Right-of-Way guidance on major projects can be found at http://www.fhwa.dot.gov/realestate/majprojguid.htm.

Selected DOT Right-of-Way (ROW) Cost Estimate Practices. This paper provides additional information and resources regarding right-of-way cost estimating procedures by several DOTs, derived from previous studies.

California DOT (Caltrans) has a well thought out, detailed right-of-way cost estimating methodology in place since 1999 and documented in its Right-of-Way manual. Project estimate data sheets appear to feed into a mainframe computer program that aggregates all project development estimates. Estimating agents are asked to input data on all reasonable alternatives using a "worst case" forecast (highest cost). Current value is estimated, new highest and best use in the projected acquisition year is evaluated and a future year cost escalator is applied. If design is not far enough along, a full take is assumed. Right-of-way estimate sheets containing all facets of acquisition, relocation, assumptions and limiting conditions are contained in Chapter 4 of the Caltrans Right-of-Way manual; see "Preparing the Estimate," Chapter 4.02, http://www.dot.ca.gov/hq/row/rowman/manual/ch4.pdf.

Virginia DOT (VDOT) completed testing its cost estimating tool in 2003. This tool generates right-of-way and utility costs as part of the project estimate. VDOT's model consistently yields results that differ from final project costs by 22 percent or less. This is better than previous methods VDOT used. They conducted a literature search, reviewed one private model and analyzed methods used by Maryland, Washington State, Florida and Delaware. VDOT improved its project scoping capability during 2003. The DOT thinks its template is easy to learn. Based on an Excel spreadsheet, it uses locality specific data for any size or type project. Users can employ computed costs done within the spreadsheet model or enter other data based on experience and judgment. The right-of-way portion contains line items for land, buildings, damages, administrative settlements, condemnation experience, and property management items.

Washington State (WSDOT) has a tool called Cost Estimation Validation Process (CEVP). It identifies risk in an attempt to reduce cost vulnerability and expresses costs in terms of a range. The website shows a range of values for several projects, see http://www.wsdot.wa.gov/projects/projectmgmt/riskassessment. A large part of the success of the Washington CEVP depends on peer evaluation. A multi-disciplinary team evaluates risk and relies on the estimator's best judgment. This system is intensive and used for major projects.

Maryland DOT (MDDOT) has a cost estimate program that uses historical costs and mid-range bid results. The DOT Project Planning and Highway Design Divisions developed this cost estimate program to assist in the development of construction cost estimates for the Consolidated Transportation Program project cost updates. This program was created in Visual Basic and has three different install files that must be run to operate correctly. Included are a Cost Estimation Guide and 8 worksheets to assist in the preparation of a cost estimate. This is the version that will be used for cost estimates for 2006: http://www.sha.state.md.us/businesswithsha/costEstBudgets/CTP/oppe/consolidated_trans.asp.

South Carolina DOT (SCDOT) uses an Excel spreadsheet based on lane mile cost. The estimate is based on the scope of the project with caveats, i.e., widening from the existing centerline, amount of right-of-way needed, etc. These are typically done in the planning or scoping stage of a project and adjusted at different stages, as plans are refined.

Florida DOT (FLDOT) includes right-of-way as a percentage of overall construction costs by type of improvement; see www.dot.state.fl.us/planning/policy/pdfs/transcost.pdf. Florida has a web-based program, called Long Range Estimating, designed to be user friendly.

Texas DOT (TXDOT) has a methodology that includes right-of-way cost estimating. It can be based on cost per mile or detailed historical cost using similar projects, with annual updates.

Iowa DOT (IADOT) methodology starts at receipt of the project concept statement using historical right-of-way costs per mile that have been recorded for each type of project: 4-lane, urban, rural, and so on. When the first rough plans are received a new estimate is completed, utilizing land values derived from sales in the project area. This is a "windshield" estimate on a parcel basis. When the right-of-way plan layout is received, appraisers provide a parcel-by-parcel estimate including relocation and damages. Historical predictors are factored using the appraiser estimate. In 2006 an additional 18% is added for contingencies and another 4% is added for condemnation. Project estimates are updated at the beginning of each fiscal year. Project information is kept using a spreadsheet format.

Cost Estimating Research

NCHRP 20-7, Project Cost Estimating, a Synthesis of Highway Practice, June 2003, does not include case studies. It contains results of a DOT survey.

NCHRP 8-49, Procedures for Cost Estimating and Management, is nearing completion and is undergoing final review. It should be available late summer or fall of 2006.

Checklist from 2004 Major Project Team Guidance: How have the following factors been considered during the preparation of the cost estimate? Identify critical issues and risks.

Cost Item	Estimated Cost	Critical Issues and Risks
Preliminary Engineering		
Right-of-Way		
Construction Cost		
Contracting Technique		
Surety		
Economic Impact		
Competition		
Wrap up Insurance		
Specialized Technology		
Material Availability		
Construction Time		
Construction Incentives		
Protection of the Traveling Public		
Design Progression		
Construction Administration		
Construction Contingencies		
Environmental Document Preparation		
Environmental Mitigations/Enhancements		
Utility Adjustments		
Railroad and Transit Adjustments		
Public Outreach		
Management Reserve		
Cost Escalation		
ITS		
Aesthetic Treatments/CSD		

Appendix B

Iowa DOT Cost Estimate Procedure

There are three separate steps in which we use to establish and update new cost estimates:

Step 1 - Information is drawn from a database where I record all project costs for completed *major* projects. This includes a cost per mile for all types of projects. *See Table 1 below.* Then separately I add up all *small* project costs to find out what the average per parcel cost is for each parcel. Small project estimates are based on a per parcel cost.

The information from these two sources is then used in the original concept of a project. This figure is further adjusted by the location of the project as well as historical information (historical predictors).

Step 2 - An updated cost estimate is made after the project is submitted to Right of Way.

Step 3 - A *second* updated cost estimate is made when the layout is complete.

The project is reviewed and updated every year after that when the next year's program is put together. This information is tracked in a database. When a cost estimate is needed, I provide a set of plans with the layout to Appraisal. Appraisal then gives me a par/par value back including any damages and relocation. Historical predictors are then factored in - we add 20% to ninety percent of the appraiser estimate and then add 40% to ten percent of the appraiser estimate for parcels that will be condemned. *See Table 2 below.*

TABLE 1		
Type	Cost Estimate per Mile	Access
4-lane interstate: Urban Rural	 $12,375,000 830,000	 Full Access
Super-Two	265,000	
2-lane highway	240,000	Limited Access
2-lane highway	285,000	Full Access
4-lane expressway	630,000	Limited Access

TABLE 2	
Appraiser Estimate	$ 5,500,000
Additional Costs = 90% x 20%	$ 990,000
Additional Costs = 10% x 40%	$ 220,000
TOTAL ROW COST	$ 6,710,000